Fei Xie

Chris Kelly

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3D Detection of Objects Using Apples Lidar Sensor

There are many applications that the LiDAR sensor on the iPhone can do, and the main selling point, or the main advantage of the LiDAR sensor is, it makes 3D scanning of an object cheap yet detailed, and more convenient than ever before. LiDAR works by calculating the time of flight for an infrared laser pulse, by calculating how long it takes for the laser pulse to travel through the air, hit an object, and then deflect back. Using the time it takes for the laser pulse to travel one can easily calculate how far away the object is from the sensor. This information can be useful creating a three-dimensional model when multiple laser pulses are sent out at once. The LiDAR system on the iphone works by using a Vscel array, it emits a total of 576 depth points at once creating a map of distances. The LiDAR sensor gives the iPhone distance information of the room or desk or any surface, so now AR is much more useful than before, now the online seller can put the 3D model of their product on top of costumer's desk, so you can have an idea how big it is, how much space it can take, and how it looks in the room before you even place the order.

Since 3D scanning is the most important feature of this LiDAR sensor, I found some interesting applications in the Geoscience industry. 3D scanning is a very important part of Geoscience research, but the traditional way of doing 3D scanning is expensive, it requires high financial investments, elaborate logistics, complicated training of staff, and extensive data processing, and usually, with some super heavy and big pieces of equipment, one single scan can cost over four thousand dollars, and scanning location is restricted, you can not go to the roughest area with such a piece of big equipment, but now with iPhone, scanning is much easier than before, all you need to do is go there and pull out you iPhone and start scanning(Luetzenburg et al., 2021). It is cheaper, requires less staff, and can go basically anywhere, you can even put your iPhone onto a drone. Some professors in Europe started using a 3D scanned model of rocks during daily lectures, which worked well. Students now have a better idea of how that rock

looks, unlike a single photo, a 3D scanned model can change the angle of view, it just helps students better understand the course(Zawacki, 2022).

I have also seen some interesting applications in agriculture, some of them are using LiDAR sensors in their yield monitoring systems. Traditional yield monitoring systems in fruit production mostly rely on color features, however, considering the light condition is always changing, it can make the monitoring process challenging, but the LiDAR sensor can give us 3D space analysis, it can alleviate such difficulties and improve the fruit detection process(Tsoulias et al., 2020). There is also a similar application in the forest industry, in order to do some forest management, they can now get some of the forests scanned into a 3D model and analysis the mapping of those trees, so people can have a better idea of the forest's condition(Tatsumi et al.).

With the ease of 3D scanning becoming easier for the average person there are a lot of ways to utilize this tool that allow for people to track changes over time and create models of things they may forget. For example many users can create scans of rooms or objects that may not be around forever. People can scan important places in their lives to forever remember them regardless of moving or disaster. Many archeologists have used this technology to begin scanning artifacts and fossils to have a digital copy just in case something were to happen to them.

While the convenience and ease of 3D scanning objects is already becoming more available, the future of the technology is moving towards using the technology to detect scanned objects. Using previous data of depths, a computer can begin to identify 3D objects that are scanned. For example if someone takes a 3D scan of an apple a computer can compare the depth map to previous scans of apples and begin to identify it considering the two scans have similar data. This capability will allow LiDAR scanning to transform into a tool that has an enormous amount of opportunities.

Reference

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